April 5, 1927. 1,623,809

H. PFANNENSTIEHL

PRINTING TELEGRAPHS

Filed July 21, 1920 7 Sheets-Sheet 1

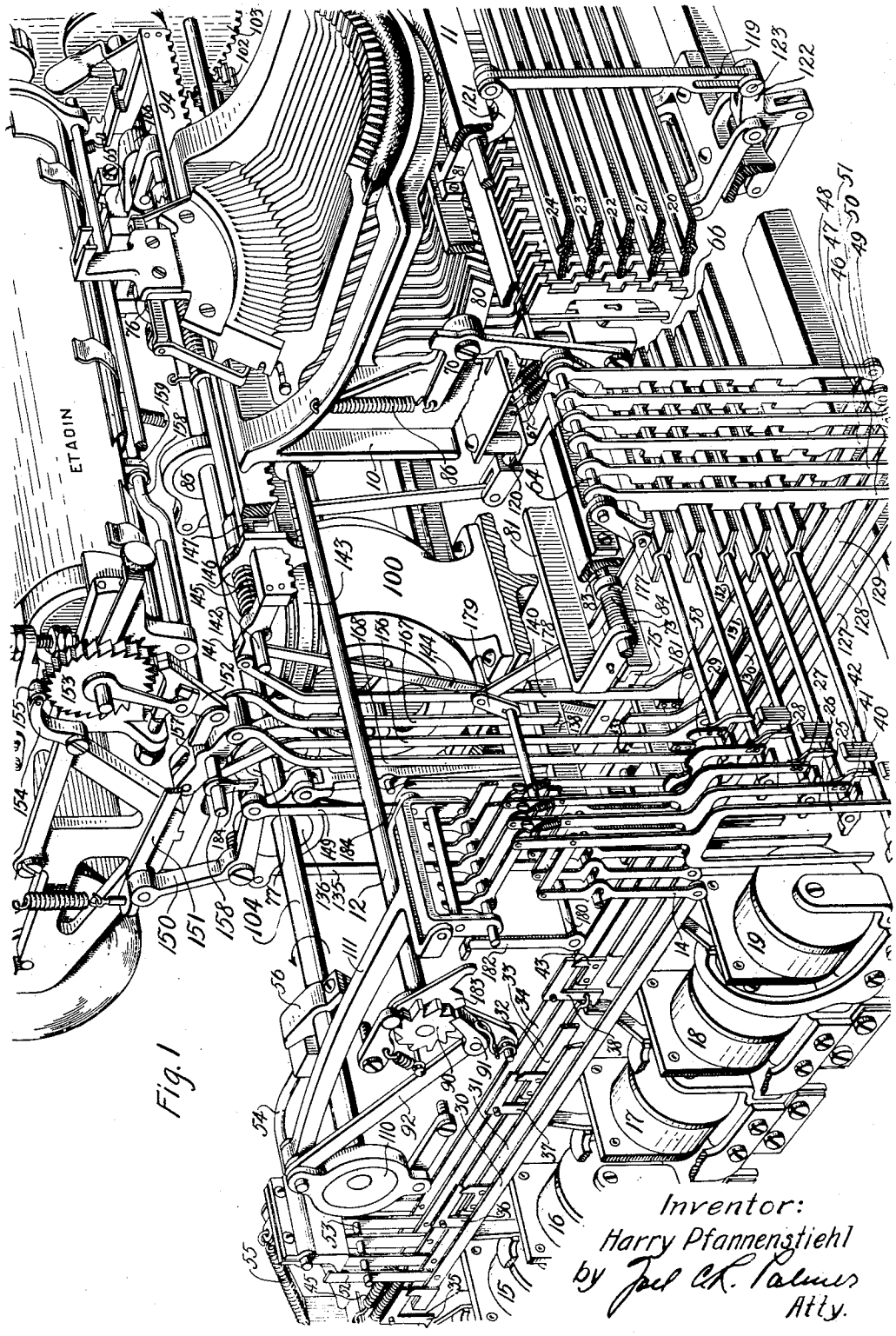

Fig. 1

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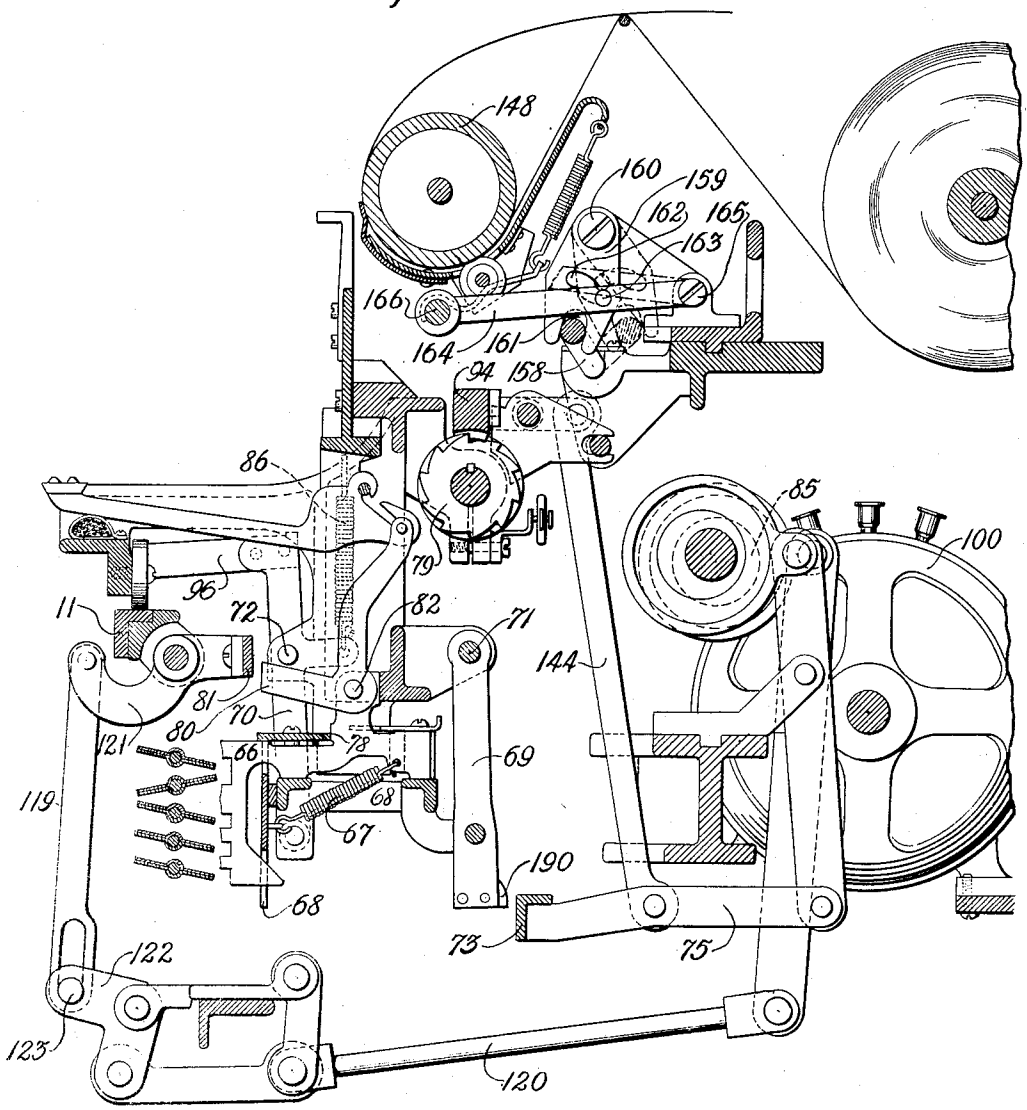
Fig. 2



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PRINTING TELEGRAPHS

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Fig. 3

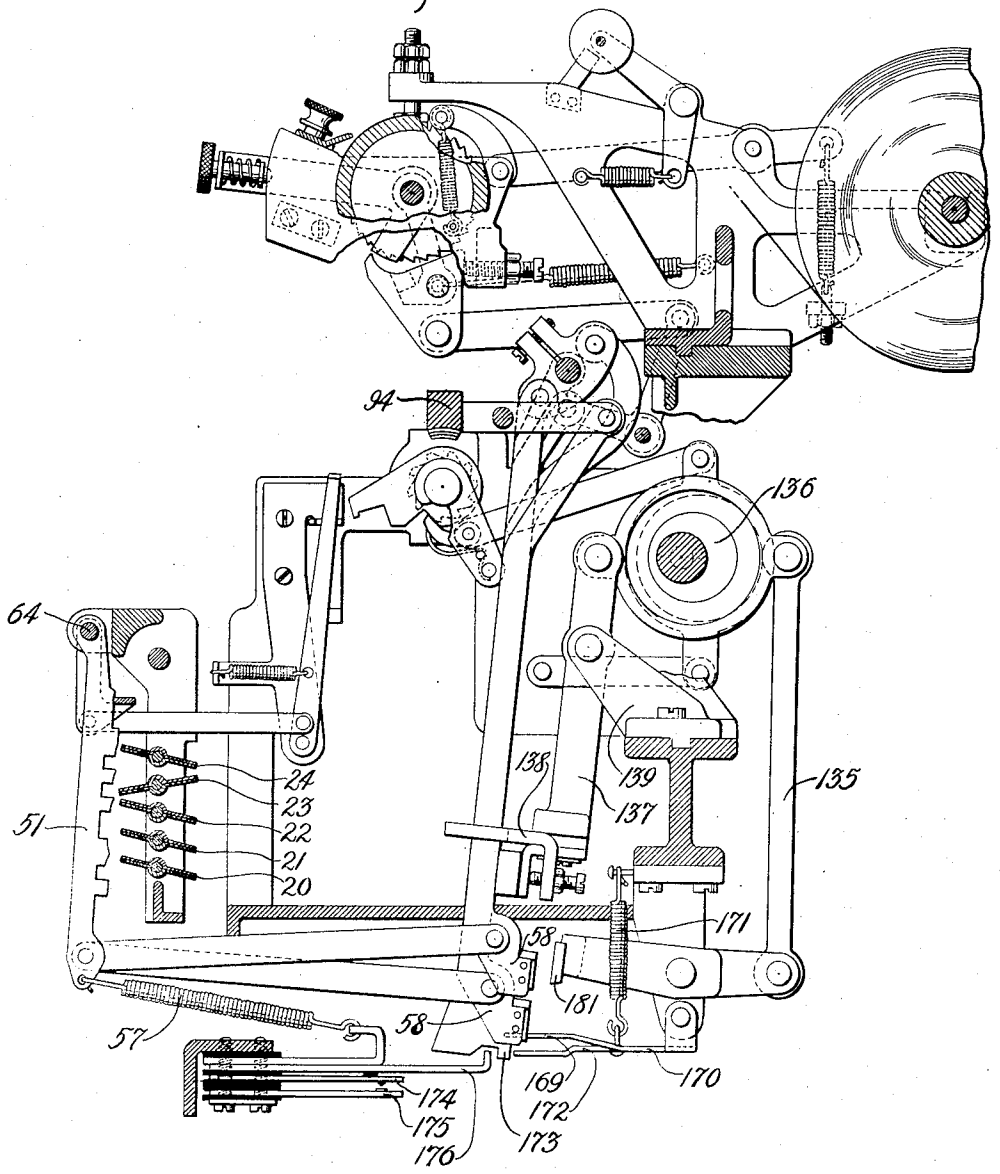

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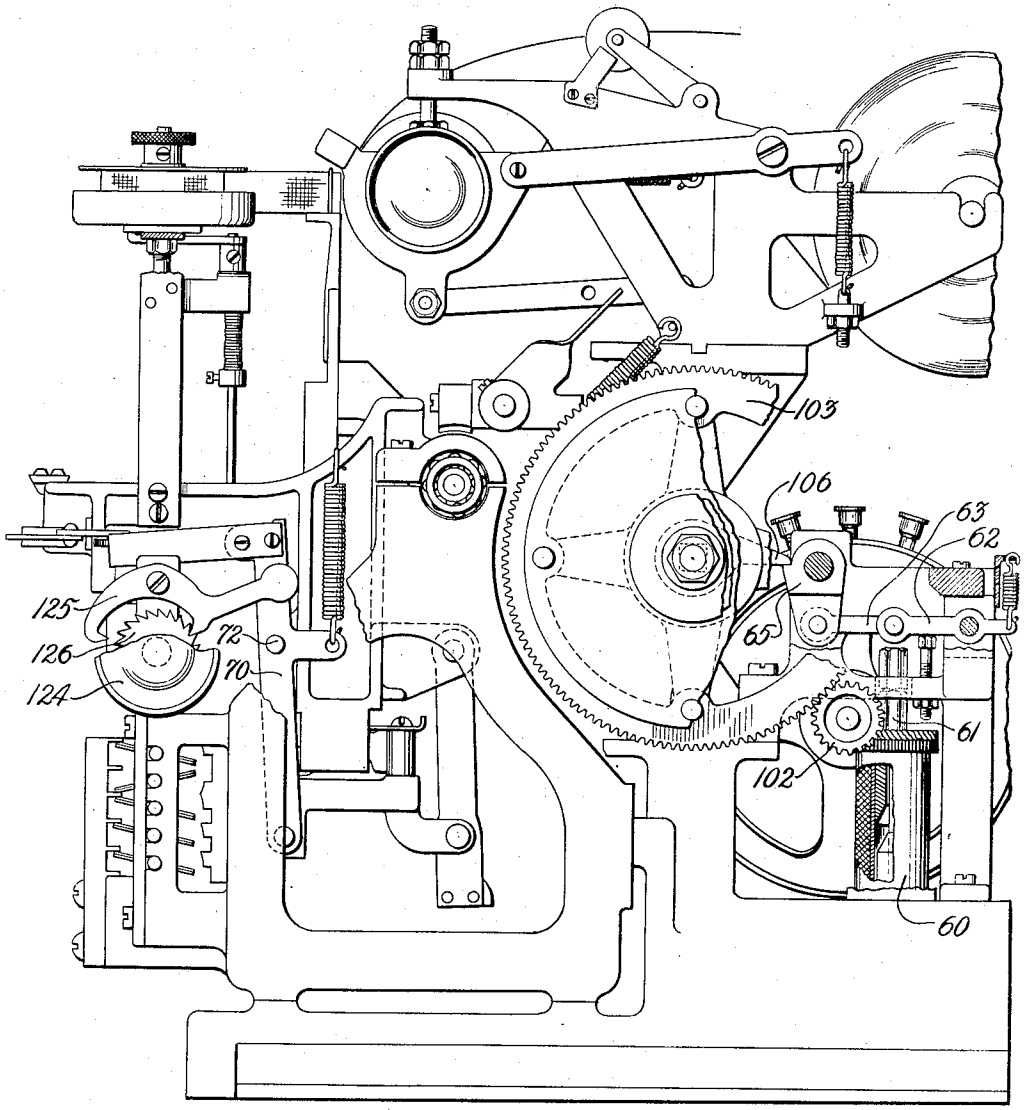
Fig. 4



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PRINTING TELEGRAPHS

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Fig. 5

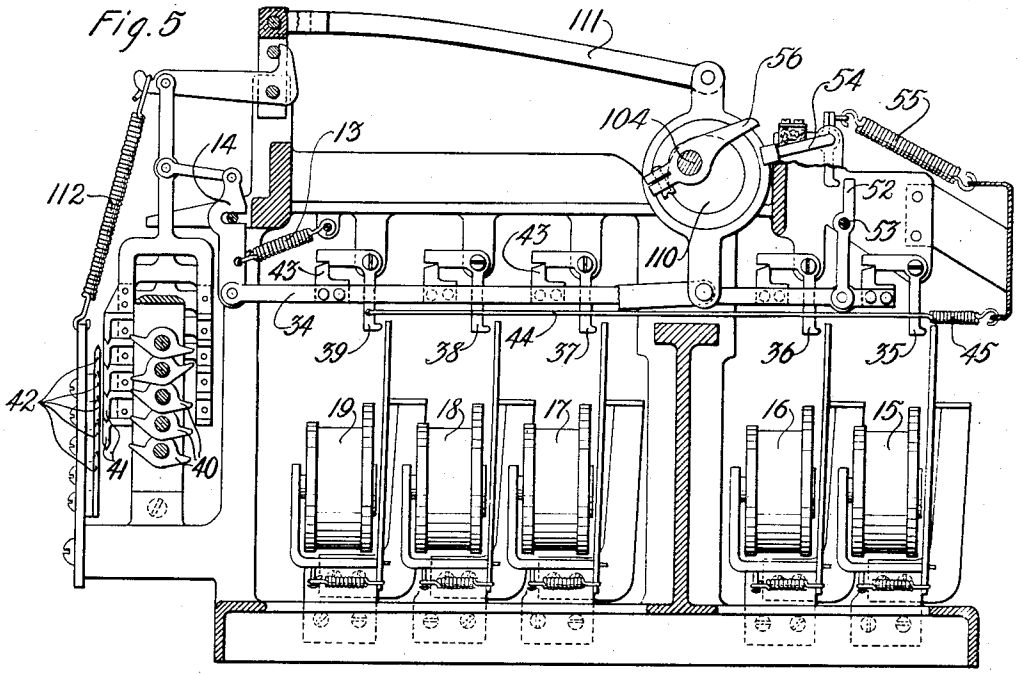
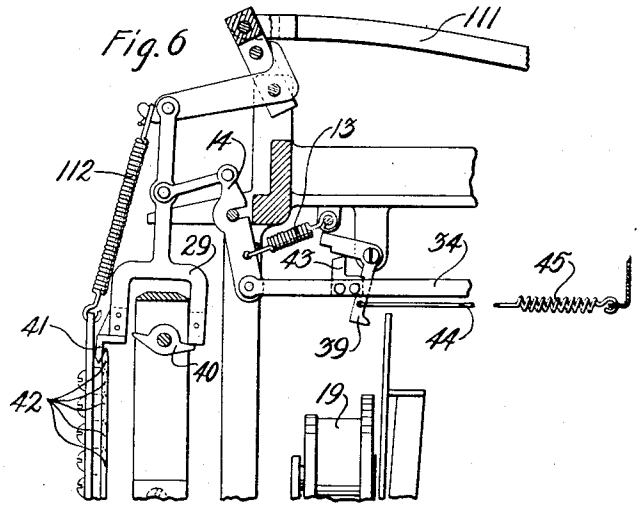


Fig. 6



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PRINTING TELEGRAPHS

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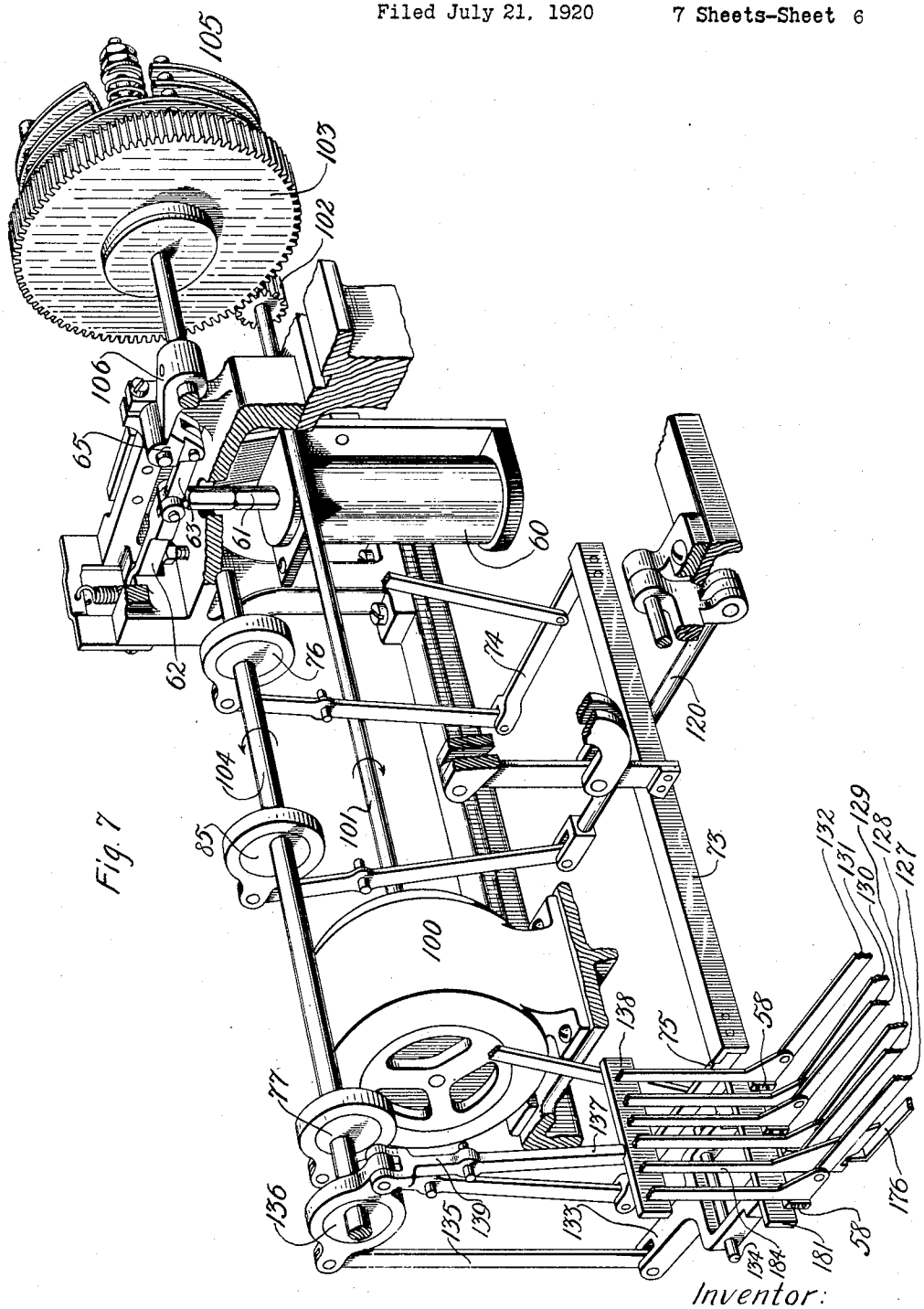

Fig. 7

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PRINTING TELEGRAPHS

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Fig. 9

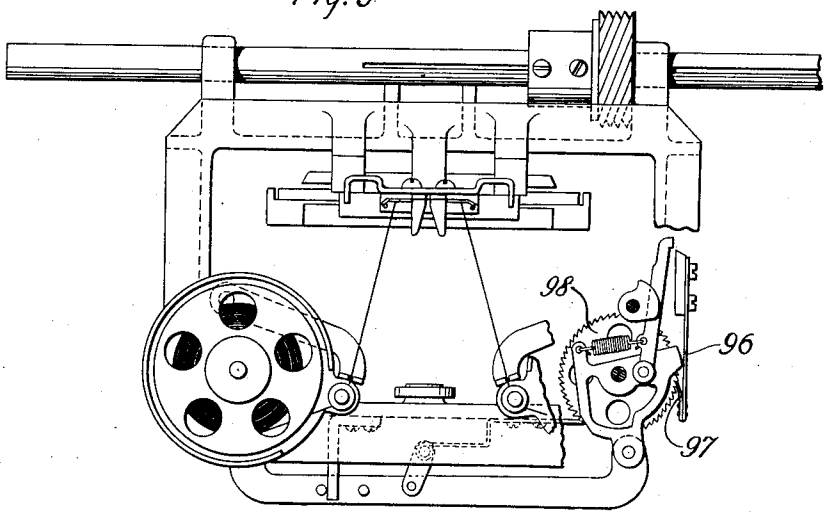


Fig. 8

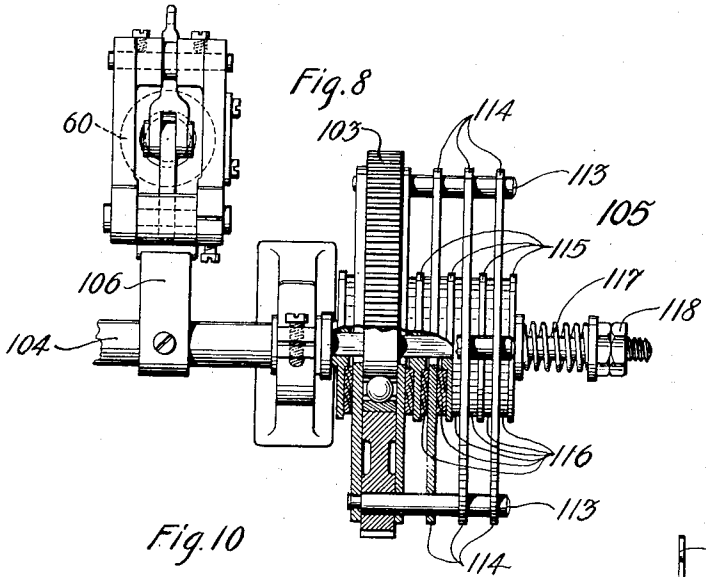
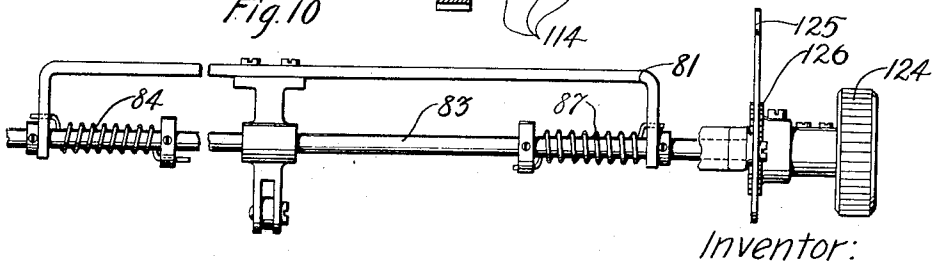


Fig. 10



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Patented Apr. 5, 1927. 1,623,809

UNITED STATES PATENT OFFICE.

HARRY PFANNENSTIEHL, OF MAPLEWOOD, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PRINTING TELEGRAPHS.

Application filed July 21, 1920. Serial No. 397,903.

This invention relates to printing telegraphs and particularly to printing telegraph receiving apparatus wherein the printing of characters and various auxiliary operations are performed by power-driven mechanism controlled by line current impulses.

An object of this invention is to provide a telegraph receiver of the above class wherein the necessary mechanical functions are performed in a reliable and efficient manner by mechanisms operated positively and with a minimum number of spring-controlled members.

Another object is the provision of means whereby the printing of one character may be effected simultaneously with the selection of the next succeeding character.

A further object is the provision of means whereby the effective stroke of the type levers may be varied while the machine is printing or while idle, so that various numbers of duplicate copies may be provided.

A still further object is the provision of means whereby the power shaft for operating the printer is normally under tension, tending to rotate, and is controlled by a friction clutch which is, in turn, controlled by line signals.

To the above ends, means are provided for distributing a series of current impulses to a plurality of selecting and operation-controlling magnets, which magnets control the selection of the desired character to be printed and operations to be performed. The invention disclosed in the accompanying drawings embodies a telegraph receiving printer, comprising stationary selecting mechanism, a stationary paper platen, and printing elements adapted to be moved transversely of the printer.

Various auxiliary or mechanical functions, such, for example, as line feed, automatic signaling, shift and unshift, carriage return, etc. are controlled by a plurality of special code bars selectively controlled by line current impulses. The various auxiliary operations of the printer are performed by a battery of eccentrics cooperating with links and bell crank levers or suitable operative members to effect the desired operation. The eccentrics are mounted on a rotatable shaft to which power may be imparted by means of a motor or any suitable driving mechanism. One of the essential features of this invention is the timing of the various operations performed by the eccentrics.

The selecting mechanism consists of a plurality of stationary selecting magnets and a corresponding number of horizontal selecting bars controlled by said magnets. The selecting bars extend entirely across the printer and are adapted to be rotated both clockwise and counter-clockwise for selection purposes, but are not arranged to be moved end-wise.

A plurality of character permutation bars or notched code bars are provided, and the arrangements of these bars with respect to the selecting bars is such that when any combination is set up by the selecting magnets, only one of the code bars will be permitted to move forward and mesh with the selecting bars. Each of the code bars controls a bell crank lever or pull-bar which is adapted to be moved forward by a code bar when selected, into the path of a reciprocating printing bar, which printing bar is preferably controlled by the rotating power shaft. When the pull bar is moved forward and engaged by the printing bar, a type face carried by the selecting type lever is thrown against the paper platen and the selected character printed. The selecting and printing operations are so timed that while one character is being printed, the next succeeding character may be selected, so that there is no time lost between the selecting and printing operations.

This invention may be considered an improvement upon the invention disclosed and claimed in Patent No. 1,374,606, issued April 12, 1921.

The above and other features of this invention will be fully set forth in the follow description and claims, and will be more readily understood by reference to the accompanying drawings, wherein Fig. 1 is a perspective view of the mechanism, as assembled, with certain parts broken away to more clearly show the cooperation between the selecting mechanism and the movable type carriage, and between the various stationary and movable parts; Fig. 2 is a vertical sectional view taken just to the right of the center of Fig. 1, with the

movable type carriage in the center of the platen; Fig. 3 is a vertical sectional view through the special selecting mechanism at the left-hand side of Fig. 1; Fig. 4 shows the printer as viewed from the right-hand end; Fig. 5 is a sectional view taken just to the right of the selecting magnets in Fig. 1; Fig. 6 is a detailed view of the mechanism operated and controlled by one of the selecting magnets; Fig. 7 is a skeleton view of the power mechanism, including the friction clutch and the power shaft, carrying the operating eccentrics; Fig. 8 is a plan view of the friction clutch and release mechanism shown in Fig. 7; Fig. 9 is a plan view of the ribbon-feeding mechanism partially shown in Fig. 4; and Fig. 10 shows an arrangement for adjusting or varying the effective stroke of the striker bar.

The mechanism herein disclosed, is operated preferably by various combinations of five positive and negative selecting impulses, with an additional impulse following each group of selecting impulses for starting the mechanism in operation. The impulses may arrive over a line from a distant station and may be distributed to the selecting and starting magnets by means of a Baudot distributor or any of the well-known distributing means. Instead of employing various combinations of positive and negative selecting impulses, it is contemplated that the mechanism may be operated by combinations of units of current and no current. When employing units of current and no current, a relay may be inserted in the line circuit and cooperate with a distributing mechanism to distribute the effective marking impulses to the selecting magnets which may take the place of positive impulses when employing groups of positive and negative impulses.

In order to simplify the drawings, particularly Fig. 1, a considerable portion of the frame structure has been omitted; also a few springs, which normally would be employed for restoring various operating parts to normal, have been omitted in order to avoid complicating the drawings. While the actual structure is singularly free from springs, it is to be understood that springs may be employed wherever necessary to assist in performing various operations and for restoring various operating parts to normal.

In the accompanying drawings there is shown a stationary paper platen, a movable type carriage, and means for selectively operating the desired type carried by the movable type carriage. The movable type carriage, including the type levers, bell crank levers, code bars, universal printing bar, etc., is adapted to be moved from left to right, transversely of the machine, against the tension of a spring, one character space for each revolution of the power shaft, and is adapted to be released and returned to its initial position by the said spring for commencing a new line of character printing. The power shaft, which performs all the mechanical operations, is constantly under tension of a friction clutch, tending to rotate. Power for rotating the shaft is supplied by means of a motor. On the motor shaft is a pinion or gear, cooperating with a larger gear, for imparting power to the power shaft through an intermediate friction clutch. The power shaft is normally restrained by means of a stop arm, securely fixed thereto, which engages an extension or holding member. For releasing the power shaft to start the printer in action, a starting magnet is provided to operate a trip or toggle joint, to thereby withdraw the holding member from engagement with the stop arm and permit the power shaft to make one complete revolution when it is again arrested by the stop arm engaging the holding member, which, in the meantime, has been restored to normal.

Referring to the drawings and particularly to Fig. 1, the invention is illustrated in combination with a type carriage of a form so well known as to require no detailed description. The type carriage 10, carrying the type bars, connecting links, code bars, etc., is supported by a portion of the frame 11 and rotatable shaft 12.

The selecting mechanism consists of five selecting magnets 15, 16, 17, 18 and 19; five horizontal selecting bars 20, 21, 22, 23 and 24, extending entirely across the printer at right angles to the code bars 66; five operating levers or members 30, 31, 32, 33 and 34; and five additional forked or bifurcated members 25, 26, 27, 28 and 29, together with various intermediate operating and connecting links. The individual selecting bars, for any given selection, are adapted to be rotated in either a clockwise or counter-clockwise direction and will remain in their actuated positions until required in a different position for another selection. The selecting bars are nicely balanced on rods, as shown in Figs. 3 and 5, supported in the frame of the machine, in any suitable manner. These selecting bars are each provided with two selecting edges. The inside edges, or the edges toward the printing mechanism, cooperate with the character permutation bars or notched selectable bars carried by the type carriage for character selection purposes, while the front edges of the selecting bars cooperate with special code bars 46, 47, 48, 49, 50 and 51, which control the various auxiliary functions, such as line feed, carriage return, etc. The character code bars and the special code bars are placed on opposite sides of the selecting bars in order to reduce the effective length of the selecting bars, and consequently the length of the

printer itself. On the rod supporting each selecting bar and at one end thereof is rigidly secured a dog member 40 having two diametrically extending arms or ears, which are adapted to be engaged by the prongs of the bifurcated members 25 to 29 inclusive.

One essential feature of the selecting mechanism is an overlap arrangement best illustrated in Figs. 5 and 6. The operation of this mechanism will be described later. It may be stated here, however, that the arrangement provides an overlap between the printing and selecting operations, such that after a given selection has been distributed to the selecting magnets, the selecting mechanism may be restored to normal and a new selection set up before the preceding character has been printed, and, in fact, before the power shaft has completed one-sixth of a revolution.

Selecting and printing.

A better understanding of the apparatus may be obtained from a description of a particular type selection and the various operations incident thereto.

Let it be assumed that the sending apparatus at the distant station is transmitting a series of impulses for selecting the character "D", and let it be assumed further that the character "D" is selected by five units combined in the following order: Positive, negative, negative, positive, negative, or it may be assumed that the five selecting units are represented by current, no current, no current, current, no current. Also let it be assumed that at the receiving station there is a line relay which responds to only positive impulses in the case of impulses of opposite polarity or to current, in the event that units of current and no current are employed. The line relay controlling the energizing circuits of the selecting magnets will, since the first and fourth impulses are marking current, cause current to be supplied to selecting magnets 19 and 16, and since the second, third and fifth units are spacing units, no current will be supplied to selecting magnets 18, 17 and 15, consequently only selecting magnets 19 and 16 will be energized. Selecting magnets 19 and 16, when energized, attract their armatures to engage the power arms of bell crank levers 39 and 36 to rotate them about their pivotal points and cause them to disengage the pawls carried by operating levers 34 and 31. The moment the operating levers 34 and 31 are released, the spring members 13, acting upon the connecting links 14 (Fig. 5), will cause the bifurcated members 29 and 26 to move to the left, as shown in Fig. 6. After the five character-selecting units have been distributed, a sixth unit or starting impulse is caused to effect the energization of release or starting magnet 60, which, when energized, causes the plunger 61 to strike the joint of the toggle members 62 and 63, as clearly shown in Figs. 4, 7 and 8. The instant the toggle joint is actuated the stop member 65, controlled thereby, moves out of the path of the rotating stop arm 106 and permits the power shaft 104 to make a complete revolution. The power shaft 104, in rotating, causes the eccentric 110 to act upon the arm 111, and in moving forward permits the bifurcated selecting members to move downward under the action of the spring members 112, as clearly shown in Fig. 6. The bifurcated members, in their downward movement, will each engage one ear of the respective dogs 40 and cause a slight rotation of the selecting bars. It will be noted in Figs. 1, 5 and 6 that one prong of each of the bifurcated members 25 to 29 inclusive, is provided with a knife-edge extension 41, which is adapted to cooperate with a fixed or stationary knife edge 42, to lock the bifurcated members in either their selected or non-selected positions. This operation of the selecting mechanism, which includes the overlap feature, will be described more in detail hereinafter.

The selecting bars 20 to 24 inclusive have now been selectively actuated to permit one and only one of the character code bars 66 to move forward astride the selecting bars. The code bars 66 are normally held in the position shown in Figs. 1 and 2 by the spring members 67, one of which is attached to each of the code bars, and a fixed piece or portion 68 of the code bar carriage. The code bar carriage consists of the frame portion 68, supported by parallelogram bars 69 and 70, which are pivoted at points 71 and 72 respectively of the movable type carriage 10. A universal bar 73 extends entirely across the type carriage in the rear thereof and is supported by extension arms 74 and 75, which are actuated by eccentrics 76 and 77 mounted on the power shaft 104. The universal bar 73 is arranged to be oscillated by the power shaft and in its forward movement engages a member 190 on the downwardly extending portion of the suspension member 69 which is secured to the code bar frame 68. The springs 67 normally tend to slide the code bars 66 forward but the bars are restrained against movement by a portion of the frame 68 engaging the code bars at a shoulder 78. However, when the universal bar 73 moves the code bar frame or supporting structure 68 forward, the restraining means is moved away from the shoulders 78, and the tension of springs 67 is thereby increased so that all of the character code bars move forward until certain of the unnotched portions of the code bars are abutted against the edges of the selecting bars. However, for each selection, there will be one code bar cut or notched so that

it will not be arrested by the selecting bars but will move forward astride the selecting bars into its selected position. The selected code bar, in moving forward, moves its corresponding bell crank lever 80 into the path of a reciprocating printing bar 81, so that on its downward stroke the printing bar strikes the end of the selected bell crank lever 80 and rotates bell crank lever 80 about its pivoted point 82, thereby causing the desired type, carried by the associated type lever, to be thrown against the paper platen in a well-known manner.

The printing bar 81, as clearly illustrated in Figs. 1 and 2, is supported on the printer frame 11 and is operated by an eccentric 85 through intermediate connecting links and levers, as clearly illustrated in Figs. 2 and 7.

The function of the code bars 66 is to move the corresponding bell crank levers 80 into the path of the oscillating printing bar 81. Therefore, as soon as a particular bell crank lever has been engaged by the printing bar, the selected code bar may be withdrawn in order that the selecting bars may be available for setting up a new selection. The group of code bars 66 carried by the frame 68 is moved forward by the universal bar 73 against the action of a pair of springs 86, one of which is mounted on each side of the type basket carriage and acts upon right-angle extensions of the supporting members 70. Therefore, as the universal bar 73 returns to its normal or inoperative position, the springs 86, acting upon supporting members 70, will cause the code bar structure to return to its normal position, as indicated in Fig. 2.

Spacing.

Spacing between characters is effected by the power shaft and in the embodiment disclosed, the type carriage is moved forward one step or one character space immediately after each character is printed. On the end of the rotatable shaft 12 is a ratchet 90 rigidly secured thereto, the teeth of which are adapted to be engaged by an operating pawl 91 controlled by an operating link 92, actuated by the eccentric 110. The ratchet 90 is rigidly secured at one extremity of spacing shaft 12 which also has secured thereto a worm wheel 79. The worm wheel 79 cooperates with the toothed rack 94 whereby the type carriage 10 is moved to the right one step or one character space for each revolution of the power shaft. Upon the release of the power shaft 104 and the operation of the eccentric 110, the arm 92 is moved in a manner to cause the stepping pawl 91 to advance the ratchet 90 through a distance equal to the space of one tooth. With such an arrangement, a corresponding rotation of the shaft 12 will be effected thereby causing a similar movement of the worm wheel 79 which, as previously described, causes the advancement of the carriage 10 to the right one step or equal to one character space. The spacing mechanism is so arranged that the type carriage will be stepped ahead immediately after a character is printed, although, obviously, spacing may be effected if desired immediately preceding the printing of each character.

When it is desired to space between words, the spacing is effected in the manner above described, but the selecting mechanism is not actuated to permit the printing of a character, that is, the first five selecting units are such that no character pull bar is selected, and consequently no pull bar will be moved into the path of the reciprocating printing bar 81.

Ribbon feed mechanism.

In Figs. 4 and 9 a ribbon feed mechanism is illustrated for winding inked ribbon from one spool to another and vice versa. The ribbon feed mechanism is of the usual typewriter construction, except that means are provided for moving the inking ribbon transversely of the printer along with the type carriage, and means controlled by selecting mechanism for advancing the ribbon from one spool to another upon the printing of each character. As illustrated in Figs. 2, 4 and 9 particularly, the member 70, which is pivoted at 72, has attached to its upper end an extension or member 96, which carries at its free end a pawl 97 adapted to engage the teeth of a ratchet wheel 98 and effect a slight rotation thereof, each time a type lever is selected and consequently the ribbon spool which is supported on the same shaft with ratchet wheel 98 is advanced each time the member 70 is oscillated by the universal bar 73.

Overlap arrangement.

As already stated, the apparatus of this invention is arranged so that a new character may be selected while the preceding character is being printed and is colloquially called an overlap. Referring particularly to Figs. 5 and 6, when the selecting magnets are energized to move the bell crank levers 35 to 39 inclusive, out of engagement with the holding members 43 carried by the operating links 30 to 34 inclusive, the operating links are moved rearwardly by the action of the springs 13 connected to the frame and rocker arms 14. Each of the bell crank levers 35 to 39 inclusive, is connected by a connecting rod 44 with a helical spring 45 which tends to hold the bell crank levers in the position shown in Fig. 5 and in position to engage the extension members 43 as soon as the operating links 30 to 34 are restored to normal. Connected to and extending upwardly from the

rear of each of the operating links 30 to 34 inclusive, is a rocker arm 52 pivoted at 53. Supported on the frame of the machine is an irregularly-shaped bell crank lever 54, which is adapted to be rotated slightly against the tension of a spring 55 and adapted, when rotated, to engage all of the rocker arms 52 attached to the selected ones of the links 30 to 34 inclusive. Mounted on the power shaft 104 and rigidly secured thereto is a striker arm 56 mounted to rotate approximately 50 degrees behind the stop arm 106. When the arm 56, during its rotation, engages the forward end of the bell crank lever 54, the other end of the corresponding lever engages the rocker arms 52 to thereby restore the operating links to normal where they are latched and retained by the bell crank levers 35 to 39 inclusive, engaging the extension members 43 carried by the operating links. While these operations are taking place, the originally selected bifurcated members 25 to 29 inclusive have been moved to their selected positions and locked by means of the knife edges 41 cooperating with the corresponding knife edges 42. It will be seen that any time after the bifurcated members are latched by the knife edges 41 and 42 in either position, a new selection may be set up by the selecting magnets, the bell crank levers 35 to 39 actuated and the links 30 to 34 inclusive placed in condition to respond to the action of spring members 13 the instant the bifurcated members are raised to a position where the knife edges 41 and 42 are disengaged. The cutting of the several eccentrics and the relative positions of the striker arm 56 and stop arm 106 are such that nearly 80 per cent of the time in recording a given character is available for the selection of a succeeding character. Thus it will be seen that the only limitation on the printer as to speed is its ability to print and perform the necessary spacing between characters.

Driving mechanism.

Referring particularly to Figs. 4, 7, and 8, there is shown a motor 100, driving shaft 101, and pinion 102 carried thereby cooperating with a gear wheel 103, for imparting motion to the power shaft 104. Power is communicated from the driving shaft to the driven shaft by means of a friction clutch 105. The construction of the friction clutch is as follows: Mounted on the side of the gear wheel 103 is a series of posts 113 on which are mounted a plurality of plates 114, adapted to rotate with the gear wheel 103. Rigidly secured to the power shaft 104 is a plurality of plates 115, which are of lesser diameter than the plates 114. Intermediate the plates 114, which are rigidly secured to the gear wheel 103 and the plates 115, which are rigidly secured to the power shaft 104, is a series of friction discs 116, which may consist of wood or any desired material. Mounted on the end of the power shaft 104 is an extension which is partially threaded, carrying a spring 117 and a nut 118 for varying the slippage or the effective gripping of the clutch members. The amount of friction between the driving and driven members is such that the power shaft 104 rotates continuously and at the same speed as the gear wheel 103 when the stop arm 106 is not arrested by the holding pawl 65. When the stop arm 106 engages pawl 65 the shaft 104 is restrained against rotation and slippage must necessarily take place between the discs 114 and 115 and the friction discs 116.

Adjustable printing blow.

In Fig. 10 is shown a detailed view of the printing bar 81, which is also shown in Figs. 1 and 2. The printing bar 81 is mounted on a shaft 83 and may be placed under the tension of spring members 84 and 87, tending to rotate the striker bar 81 in a downward direction. The motion of the striker bar in this direction is normally prevented by the connecting links 119 and 120, levers 121 and 122, etc., clearly shown in Fig. 2, which are under control of the eccentric 85. When the connecting link 120 is moved forward a pin 123, secured to bell crank lever 122, operates in a slot in the end of connecting link 119 and permits the link 119 to move in an upward direction and the striker bar 81 in a downward direction, under the tension of springs 84 and 87 or the power stored therein. That is, the strength or effectiveness of the blow of the striker bar 81 may be adjusted or regulated by the amount of power stored in springs 84 and 87, which may be controlled by the knurled knob 124 keyed to the shaft 83. Member 125 more clearly shown in Fig. 4, is a double-acting release mechanism arranged to cooperate with the ratchet 126 for unwinding springs 84 and 87 if desired to reduce the tension of the respective spring members. This arrangement is desirable and quite essential in a printer of this kind where, under certain conditions, it may be desired to make only a single copy, while under other conditions it may be desirable to make a variable number of copies varying all the way from two to twenty. Therefore, when making a single copy or a limited number of copies, the tension on springs 84 and 87 may be comparatively light, while to produce clear carbon copies when manifolding as many as fifteen or twenty copies at a time, it is desirable that the tension on springs 84 and 87 be considerably greater. The mechanism disclosed provides means for printing characters in duplicate with any desired degree of clearness and for adjust-

ing the striker-bar without stopping the printer.

Auxiliary selections.

In addition to selecting and printing various characters and providing means for spacing between characters and words, as hereinbefore described, there are various auxiliary mechanical operations to be performed, such, for example, as carriage return, line spacing, shift and unshift (that is, shifting from lower case to upper and vice versa), automatic signaling, etc.

To the left-hand side of Fig. 1 is shown a plurality of special code bars 46 to 51 inclusive, which are similar to the character code bars 66 carried by the movable type carriage 10. The special code bars are pivoted just above the selecting bars on a rod 64. The lower ends of the special code bars 46 to 51 inclusive are pivotally connected to links 127 to 132 inclusive, respectively, and also each of the special code bars has attached thereto a spring member 57, tending to move each of the special code bars toward the selecting bars. The special code bars are normally held against the edges of the selecting bars except during the time the selecting bars are being actuated when the special code bars are moved away therefrom, in order not to interfere with the free movement of the selecting bars. Each of the link members 127 to 132 inclusive, is connected at its forward end to one of the special code bars and at its rearward end to an upwardly extending pull bar. Each of the pull bars 140, 167, 156, 168 and 149 is provided with a heel or extension member 58, as clearly shown in Fig. 3. These heels or extension members are moved into the path of an auxiliary striker bar 181, which corresponds to the character striker bar 81.

The auxiliary striker bar 181 is carried by a bifurcated rocker arm 133 pivotally supported on a rod 134. The rear end of the rocker arm 133 is pivotally connected to a link 135 which, in turn, is connected to and actuated by an eccentric 136 on the power shaft 104. On the opposite side of the eccentric 136 there is pivotally connected another link member 137, to the lower end of which is connected a plate 138 partially slotted, to receive each of the pull bars connected to the special code bar links 127 to 132 inclusive. Connected to the link 137 is a pivoted arm 139, which cooperates with the eccentric 136 to move the link 137 forward and by means of the partially slotted plate 138, the several pull bars cooperating with the link members 127 to 132 move the special code bars out of engagement with the edges of the selecting bars, while the selecting bars are being actuated. These operating parts, however, are withdrawn in ample time to allow the spring members 57 to draw the heel members 58 carried by the pull bars into the path of the reciprocating striker bar 181.

It will be understood, of course, that the special code bars 46 to 51 are selectively controlled by line current impulses in substantially the same manner as the character code bars 66, that is, the various auxiliary mechanical functions are selectively controlled by code signals which are transmitted in the same manner and by the same means as the various character signals; also the power for performing the various mechanical functions is supplied by the rotary power shaft 104, as hereinbefore described in connection with character printing.

Type carriage return.

Mention has already been made of the manner in which the type carriage is moved from left to right, step by step for line printing. When a full line has been printed or when it is desired to return the type carriage to the left to commence a new line, a group of selecting units is transmitted over the line to cause the selecting mechanism to select the special code bar 51, which group of selecting units is followed by a sixth or starting unit, as usual for releasing the power shaft. The code bar 51, when selected, permits the heel or extension member 58, carried by the pull bar 140, to move into the path of the auxiliary striker bar 181. As the power shaft rotates and actuates the eccentric 136, the auxiliary striker bar is reciprocated and by reason of the selection of the special code bar 51, the pull bar 140 which is connected at one end to link member 132, and at the upper end to a rocker arm 141, which, in turn, is pivotally supported on a rod 142, causing the toothed rack 94 to be moved out of engagement with the worm wheel 79 mounted on the rotatable shaft 12. By disengaging the worm wheel 79 and the rack 94, the type carriage 10 is free to be returned by a power spring 143 for the commencement of a new line.

It is preferable that when the type carriage is being returned for commencing a new line, there should be no unnecessary friction between the stationary and movable parts. Therefore, it is desirable that means be provided to prevent engagement of the universal bar 73 with the movable type carriage. This is accomplished by providing a lever 144, one end of which is pivotally connected to the rocker arm 141 and the other end of which is pivotally connected to the rocker arm 75 on which the universal bar is mounted. Therefore, as the toothed rack 94 is raised or moved out of engagement with its cooperating worm wheel, the striker bar 73 is moved downwardly to a position where it cannot engage the type carriage.

Mounted on the rod 142 is a spring 145 and a key 146; also mounted on the toothed rack 94 is a member 147 having a shoulder, which is adapted to engage the key 146 when the toothed rack is raised and hold the rack in its elevated position until the type carriage is returned to its initial position for the commencement of a new line, whereupon a shoulder of the type carriage will engage an extension of the key 146, forcing it to the left against the action of spring 145, thereby releasing the member 147 to permit the toothed rack to return and engage the worm wheel so that the carriage may be advanced step by step to print the characters of another line.

Line feed.

For the purpose of rotating the platen 148 to feed the paper and space between lines of printed characters, a special code bar 46 is provided which cooperates with a link 127 and pull bar 149. When the code bar 46 is selected and permitted to move forward, it moves the heel member 58 carried by the pull bar 149 into the path of the auxiliary striker bar 181, and when engaged thereby, the pull bar is pulled downwardly, thereby rotating a bell crank lever 150, which, by means of a lever 151 and actuating pawl 152 cooperating with a ratchet 153, rotates the paper platen, and thereby feeds the paper for line spacing, as clearly shown in Figs. 1 and 3. A holding member 154, carrying a jockey roller 155, is provided to prevent overthrow and to hold the ratchet wheel in its advanced position, as is well known in the art.

Platen shift.

The type bars are provided with two rows of type faces, one above the other. The lower row of type faces is the row normally used. When it is desired to print, from the upper row of type faces, a particular group of signaling units is transmitted to select the special code bar 49, which cooperates with suitable mechanism to raise the paper platen so that when the type bars are operated the type faces of the upper row will be pressed against the platen. When the special bar 49 is selected and permitted to move forward, a pull bar 156 connected to link member 130, is actuated by the striker bar 181 as previously described. The upper end of pull bar 156 is connected to a rocker arm 157, which is rigidly secured to an irregularly-shaped rod 158, which is in the form of a bell crank lever. The bell crank lever 158, as shown in Figs. 1 and 2, cooperates with an open slot 161 in a member 159, pivotally supported at 160. The member 159 has a closed S-shaped slot 162, with which a pin 163 secured to link member 164 cooperates. The link member 164 is pivotally supported at one end on a rod 165, and at the other end is connected to a rod 166 which forms a part of the platen carriage. Referring to the structure as shown in Fig. 2, when the bell crank lever 158 is rotated in a clockwise direction by the actuation of pull bar 156, the pivotally supported member 159 is moved to the right and the pin 163, which is rigidly secured to link member 164 rides on the cam surface of the S-shaped slot 162 and thereby elevates the paper platen 148 so that characters may be printed from the upper row of type faces. The bell crank lever 158, slotted member 159 and line 164 when actuated will remain in the dotted line position, thereby holding the paper platen in its shifted position until a special group of signals is received to unshift the paper platen.

Platen unshift.

To unshift or return the platen to normal it is necessary to turn the bell crank lever 158 from its dotted line position to the full line position. This is accomplished by transmitting a group of impulses to select the special code bar 50, which, when permitted to move forward, moves the member 58 carried by the pull bar 167 into the path of the reciprocating striker bar 181. The pull bar 167, connected to one end of the link member 131 and at the other end to rocker arm 157, when actuated by the auxiliary striker bar, rotates the bell crank lever 159 from its dotted line position to its full line position, thereby restoring the paper platen to its normal position to print characters from the lower row of type faces.

Unshift of platen when word spacing.

There are many characters carried in the upper row of type, such as punctuation marks, which are invariably employed at the end of a word. Therefore, when it is desired to place a comma, period, semi-colon, etc., after a word, it is usually necessary to send first a shift signal, because punctuation marks are carried on the upper row of type faces, a second group of signals to record the desired punctuation mark, a third group of signals to unshift or restore the platen to normal position, and then a fourth group of impulses to provide the necessary space between the punctuation mark and the first character of the succeeding word. Therefore, one feature of this invention is to lessen the number of steps required to shift, print, unshift and word-space. This has been accomplished by combining the operation of spacing between words and unshifting the paper platen so that both steps may be performed in one operation. In order to accomplish this feature, a special code bar 48 is provided for controlling a pull bar 168 which is similar to pull bar 167. The special

code bar 48 is notched so that it responds to a group of spacing units and if the platen is in its unshifted position, the pull bar 168 performs no work, because the heel member 58 connected to the pull bar 168 is held below the path of travel of the auxiliary striker bar 181. However, if the platen is in its shifted position and a special group of signaling units is received to select the code bar 48, the pull bar 168 will be actuated in the same manner as pull bar 167, previously described, and will cooperate with the rocker arm 157, and bell crank lever 158, as already described, to return the platen to its original or unshifted position. The spacing of the type carriage is accomplished as previously described.

Automatic signaling.

It is desirable that the sending operator should, at certain times, be able to signal the receiving operator. This may be accomplished by transmitting a group of signaling units to select the special code bar 47. In order to operate the signaling device, it is necessary that the printing platen be in its shifted position. Referring particularly to Fig. 3, when the pull bar 156, which controls the shifting of the paper platen, is moved downwardly by the action of the reciprocating striker bar 181, the extension member 58, carried by pull bar 156, engages a prong 169 of a bifurcated member 170, and in forcing it downwardly against the action of spring 171, it moves the corresponding prong 172 down below a special extension member 173 carried by the pull bar 184. Mounted immediately below the members 128 and 173 is a pair of spring contacts 174 and 175, which are normally open and adapted to be closed upon the depression of the spring member 176. Spring member 176, is provided with an extension arranged to cooperate with a notch or cam surface in the member 173. As will be seen from Fig. 3, the link 128 and extension member 173 controlled by the special code bar 47, in moving to the right (Fig. 3) when the code bar 47 is selected, will cause the contacts 174 and 175 to close a signaling circuit which may include a lamp, bell or any desired signaling device. The pull bar 184 is not provided with an extension member 58 and therefore does not cooperate with the universal striker bar 181.

It is obvious that to operate the signaling device a plurality of times successively, the code bar 47 may be repeatedly selected as often as desired.

When the special code bars are selected to control the various mechanical functions hereinbefore mentioned, it is necessary that means be provided to prevent actuation of the type carriage so that spacing does not take place except when desired. This is taken care of by providing a bail 177 pivotally supported on the rod 64 and extending in the path of motion of the special code bars. Connected to the bail 177 is an actuating arm 178 pivotally connected to another arm 179 which is rigidly secured to a rod 180. On the rod 180 is also mounted an arm 182, which is adapted to cooperate with an arm 183, mounted on the spacing shaft 12. When any one of the auxiliary code bars except the spacing code bar 48 is selected, the bail 137 is operated for causing the displacement of the rod 180 through the linkage arrangement 178 and 179. Upon the rotation of the rod 180, the arm 182 which is rigidly secured thereto is moved forward so that the extension carried thereby moves into the path of the arm 183 which is rigidly secured to the shaft 12 and which is moved upon each rotation of the ratchet 90. However, when the arm 182 is moved in the path of the arm 183, the ratchet 90 together with the shaft 12 is restrained against rotation thereby preventing the spacing of the type carriage 10, upon the selection of any one of the code bars 46, 47, 49, 50 and 51.

What is claimed is:

1. In a printing telegraph receiver, a plurality of selecting members capable of being moved simultaneously to either of two positions, and selecting mechanism for positively and simultaneously moving said members individually to either of the two positions to form various characteristic selecting combinations.

2. In a printing telegraph receiver, a plurality of selecting bars capable of being moved simultaneously to either of two positions, and selecting mechanism controlled by line impulses for positively and simultaneously moving said bars individually to either of the two positions to form various characteristic selecting combinations.

3. In a printing telegraph receiver, a plurality of selecting bars, a plurality of electromagnets, and selectively operable means for selectively moving said selecting bars simultaneously into either of two positions for selection purposes said means being controlled by said magnets.

4. A receiving printer comprising a plurality of selecting members capable of being moved simultaneously to either of two positions, a plurality of actuating members therefor, a corresponding number of members normally tending to move to control said actuating members, and means controlled by line current impulses for selectively releasing predetermined ones of said controlling members, whereby said actuating members are actuated to move said selecting members to either of the two positions simultaneously.

5. A receiving printer comprising a plurality of selecting members capable of being moved simultaneously to either of two posi-

tions, actuating means for said members, a plurality of elements for controlling the position of said actuating means, means controlled by line current impulses for releasing said elements, and power mechanism for controlling the said actuating means whereby said members are moved simultaneously to either of the two positions.

6. In a printing telegraph receiver, a plurality of selecting magnets, a plurality of selecting bars, a corresponding number of controlling members controlled by said magnets, means for actuating said controlling members to move said selecting bars simultaneously to either of two positions, and power-operated means to restore the controlling members to normal position.

7. In a printing telegraph receiver, a plurality of selecting members individually movable in either a clockwise or counter-clockwise direction, actuating means to move said selecting members in either direction simultaneously, and mechanism controlled by line current impulses to determine the direction of motion of said members.

8. In a printing telegraph receiver, a plurality of selecting members individually movable in either of two directions, actuating means to move said members in either direction simultaneously, mechanism controlled by line current impulses to determine the direction of motion of said selecting members, and power-operated means to restore said actuating means to normal position.

9. In a printing telegraph receiver, a plurality of selecting members individually movable in either of two directions, means responsive to a group of line current impulses for selectively actuating predetermined ones of said members simultaneously in either of two directions, and means operating on receipt of a second set of line impulses to alter only those of the previously actuated members which do not enter into the second selection.

10. In a printing telegraph receiver, a selecting mechanism comprising a plurality of selecting bars movable in either a clockwise or counter-clockwise direction, actuating means for moving said bars simultaneously in either direction, and means controlled by line current impulses for rendering said actuating means effective.

11. In a printing telegraph receiver, a traveling carriage having a plurality of selectable members movable therewith, a plurality of stationary selectable members, means common to all of said members for selecting any one of them, and means for selectively moving said last-mentioned means in either of two directions for selection purposes.

12. In a printing telegraph receiver a traveling carriage having a plurality of selectable members movable therewith, a plurality of stationary selectable members, a plurality of selecting members for selecting any one of said selectable members, each of said selecting members being provided with a plurality of selecting edges and arranged to select said movable selectable members by one set of edges and the stationary selectable members by another set of edges.

13. In a printing telegraph receiver, a plurality of selecting members having a plurality of sets of selecting parts, character code bars cooperating with one of said sets of selecting parts and other code bars cooperating with the other of said sets of selecting parts, and power-operated means for completing the operations determined by said selected code bars.

14. In a printing telegraph receiver, a plurality of balanced rotating selecting members, means responsive to line current impulses for rotating predetermined ones of said members, and means whereby a new selection may be set up without disturbing predetermined ones of said actuated members.

15. In a printing telegraph receiver, a plurality of selecting members comprising a plurality of sets of selecting edges, character code bars cooperating with one of said sets of selecting edges for character selection purposes, and a plurality of auxiliary code bars cooperating with the other of said sets of selecting edges.

16. In a printing telegraph receiver, a set of normally inert selecting bars, means controlled by line current impulses for simultaneously moving said members in characteristic combinations for selection purposes, and means whereby the positions of only those actuated members which do not enter into a succeeding code combination are altered upon receipt of a second set of impulses.

17. In a printing telegraph receiver, the combination of a traveling type carriage comprising a plurality of character arms, a selectable member individual to each character arm, an actuating lever connected directly to each selectable member and its corresponding character arm, stationary selecting bars cooperating with said selectable members to select one of said character arms, and a striker bar common to all of said selectable members and adapted to engage the selected actuating lever for printing the desired character.

18. In a printing telegraph receiver, a plurality of selecting bars, a plurality of selectable bars the selection of any one of which determines the character to be printed, a type carriage carrying a plurality of type levers, a support for said selectable bars suspended from said type carriage, an operating link connected directly to each of said type levers and its corresponding selectable member, and means for moving said

support to bring said selectable bars into co-operation with said selecting bars.

19. A printing telegraph receiver comprising a plurality of selecting members individually movable simultaneously in a plurality of directions for selection purposes, and selectively operable means for moving said members in characteristic combinations simultaneously and for selectively altering the positions of the previously actuated members.

20. In a printing telegraph apparatus comprising a rotatable power shaft, a friction clutch for driving said shaft, a stop arm carried by said rotatable shaft, a holding pawl normally in engagement with said stop arm to prevent rotation of said shaft, a toggle joint controlling said holding pawl, and an electro-magnet for operating said toggle joint to release said power shaft.

21. In a printing telegraph receiver, a power shaft normally tending to rotate, a friction clutch for driving said shaft, means controlled by said shaft for effecting the selection and printing of any desired character, a holding pawl for said shaft, a toggle joint controlling said holding pawl, and line-controlled means for actuating said toggle joint to release said power shaft.

22. In a printing telegraph receiver comprising selectable members, means to select one of said members, a reciprocating striker bar adapted to engage the selected member, and ratchet means to vary the effective stroke of said striking bar.

23. In a printing telegraph receiver comprising selectable members, means to select one of said members, printing elements controlled by said members to print the characters of a message, a reciprocating striker bar adapted to engage the selected member, and ratchet means to vary the effective stroke of said striker bar.

24. In a printing telegraph receiver comprising selectable members, means to select one of said members, a striker bar, a motor for controlling said striker bar, and pawl and ratchet means for adjusting the force of said striker bar.

25. In a printing telegraph receiver comprising selectable members, means to select one of said members, a striker bar, a spring for actuating said bar, and pawl and ratchet means for varying the power stored in said spring.

26. In a printing telegraph receiver, a plurality of selecting members having no normal position and movable through the arc of a circle to their operating positions, and selecting mechanisms for positively moving said members individually to one or the other of their operative positions to form various characteristic selecting combinations.

27. In a printing telegraph receiver, a plurality of selecting members pivoted at a point midway from their edges having no normal position and movable in two directions, and selecting mechanism for positively moving said members individually to one or the other position to form various characteristic selecting combinations.

28. In a printing telegraph machine, a plurality of type-carrying bars and a selecting mechanism controlling said type-carrying bars, said selecting mechanism comprising a plurality of selecting means, and a plurality of selector members moved to selected positions by said selecting means and adapted to remain in their last selected position until another position is required in a subsequent selective operation.

29. In a printing telegraph machine, a plurality of type-carrying bars and a selecting mechanism controlling said type-carrying bars, said selecting mechanism comprising a plurality of selective means, and a plurality of selector bars moved to selected positions by said selecting means and adapted to remain in their last selected position until another position is required in a subsequent selective operation.

30. In a printing telegraph machine, a plurality of type-carrying bars and a selecting mechanism controlling said type-carrying bars, said selecting mechanism comprising a plurality of selecting means, a plurality of transfer and storage members controlled by said selecting means, and a plurality of selector members moved to selected positions by said selecting means and adapted to remain in their last selected position until a different position is required in a subsequent selective operation.

31. In a printing telegraph receiver, a plurality of selecting elements, an operating member individual to each of said elements, a plurality of electromagnets equal in number to the number of members and responsive to selecting units for releasing the members to condition the corresponding selecting elements for operation, and means controlled by the release of any one of the members for moving the corresponding selecting elements into a selecting position.

32. In a printing telegraph receiver, a plurality of selecting elements, an operating member individual to each of said elements, means for setting said members in a definite order, and means operated following the operation of any one of said members for simultaneously moving said selecting elements in accordance with a setting of the members.

33. In a printing telegraph receiver, a plurality of selecting elements, a device individual to each selecting element, electromagnetic means responsive to selecting current units for operating said devices to condition the corresponding selecting element

for operation, and means operated following the operation of any one of said devices for moving said selecting elements into a selecting position.

34. In a printing telegraph receiver, a plurality of selecting elements, a pivoted member individual to each of the selecting elements, a latch individual to each of the pivoted members for holding the members in their normal position, a plurality of electromagnets corresponding in number to the number of pivoted members operative in response to selecting current units for releasing the pivoted members normally in engagement with their corresponding latch, and an electromagnet controlled by the release of any one of the pivoted members for controlling the movement of said selecting elements into a selecting position.

35. In a selecting mechanism, a plurality of selecting means, a plurality of transfer and storage members controlled by said selecting means, a movable carrier for said transfer and storage members, and a plurality of movable selector members actuated by said transfer and storage members only when said selector members are to be moved to a position differing from that occupied during the preceding selective operation.

36. In a selecting mechanism, a plurality of selecting magnets, a plurality of transfer and storage members controlled by said selecting magnets, a movable carrier for said transfer and storage members, and a plurality of movable selector bars actuated by said transfer and storage members only when said selector bars are to be moved to a position differing from that occupied during the preceding selective operation.

37. In combination in a telegraph receiver, a set of permutation members; a corresponding set of actuating devices operative in each of two conditions for shifting the corresponding permutation member from one of two positions to the other; means for reciprocating said actuating devices to effect the operation thereof upon said permutation members; and electromagnetic means for determining the operative conditions of said actuating devices in response to received code combinations.

38. In a selective mechanism, a plurality of selective members, a plurality of impulse responsive devices equal in number to the number of said members, operating links intermediate said members and said devices, means for energizing said devices in accordance with code current impulses to cause said links to correspondingly position said members in selective combinations, and means to release said links without affecting the setting of said members whereby said devices may be reenergized by succeeding code currents while said members are in their previously set positions.

39. In a selective mechanism, a plurality of selecting members adapted to be set in permutable combinations, a plurality of electromagnets having armatures to be actuated according to received code combinations of electrical impulses, a plurality of links operatively connecting said armatures with said members, means responsive to a selective energization of said magnets for setting said members in a corresponding selective combination, means for locking said members in their set positions whereby said magnets may be energized by a succeeding combination of impulses while said members remain in their preceding set positions.

In witness whereof, I hereunto subscribe my name this 14th day of July A. D., 1920.

HARRY PFANNENSTIEHL.